



The Patent Office  
Concept House  
Cardiff Road  
Newport  
South Wales  
NP10 8QQ



I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

**PRIORITY DOCUMENT**  
SUBMITTED OR TRANSMITTED IN  
COMPLIANCE WITH  
RULE 17.1(a) OR (b)

Signed

Dated 19 January 2004

**BEST AVAILABLE COPY**

21 MAR 2003

THE PATENT OFFICE LONDON DUBLIN DUBLIN

JL

Patents Form 1/77

1/77 1 MAR 2003

Patents Act 1977  
(Rule 16)

RECEIVED BY FAX



*Received* 1/77

21 MAR 03 E793962-1 D10149  
P01/7700 0.00-0306449.0

The Patent Office

Cardiff Road  
Newport  
South Wales  
NP10 8QQ**Request for grant of a patent**

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1. Your reference

30085 GB

2. Patent application number  
(The Patent Office will fill in this part)

0306449.0

21 MAR 2003

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Givaudan SA  
Chemin de la Parfumerie 5  
1214 Vernier  
Switzerland

8408031001

Patents ADP Number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

Switzerland

4. Title of the Invention

Device

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Centre for Innovative Technology (Givaudan UK Ltd.)  
76-80 Church Street, Staines  
Middlesex TW18 4XR  
United Kingdom

Patents ADP number (if you know it)

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country      Priority application number (if you know it)      Date of filing (day/month/year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application      Date of filing (day/month/year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if.)  
a) any applicant named in part 3 is not an inventor, or  
b) there is an inventor who is not named as an applicant, or  
c) any named applicant is a corporate body.  
See note (d)

yes

Patents Form 1/77

0064073 21 Mar 03 07:48

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form.  
Do not count copies of the same document.

Continuation sheets of this form

Description 7

Claim(s) 1

Abstract 1

Drawing(s) 3

*only 3*

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

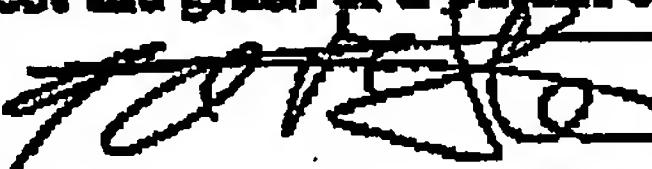
Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

1

11.

I/We request the grant of a patent on the basis of this application.

Signature 

Date 21 March 2003

12. Name and daytime telephone number of person to contact in the United Kingdom

Colin Brown (office time) Tel. No: 01/784417721

**Warning**

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

**Notes**

- a) If you need help to fill in this form or you have any questions, please contact the Patent Office on 08459 500505
- b) Write your answers in capital letters using black ink or you may type them.
- c) If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- d) If you have answered 'Yes' Patents Form 7/77 will need to be filed.
- e) Once you have filled in this form you must remember to sign and date it.
- f) For details of the fee and ways to pay please contact the Patent Office.

## DEVICE

This invention relates to a device for diffusing volatile material into an atmosphere.

5 Devices for diffusing volatile materials into an atmosphere, for example, air fresheners and insect repellents, are well known to the art. A typical device comprises a container adapted to store liquid volatile material and a diffusion member that provides the material to the atmosphere via an evaporation surface. This diffusion member receives the liquid for evaporation via a liquid conveying member, typically a wick of fibrous material. While 10 having the advantages of cheapness and simplicity, the traditional wick has the drawback with some materials, such as fragrances, that the material diffused therefrom changes over time because of the earlier diffusion (and earlier exhaustion) of more volatile components, as a result of a fractionation of the components, similar to what occurs in a chromatographic column. A recent alternative construction seeking to overcome this problem has been the use 15 of at least one capillary, extending from the liquid to the atmosphere. This capillary can take the form of a rod, provided with external grooves of capillary dimensions. While this overcomes the fractionation problem, it is more prone to leakage, for example, if the device is knocked over.

20 It has now been found that it is possible to provide a device that combines the advantages of the two types hereinabove mentioned, while substantially avoiding their disadvantages. The invention therefore provides a device adapted to provide volatile liquid material to an atmosphere, comprising a reservoir containing volatile liquid material, a rod-like transfer member extending therefrom and adapted to transfer liquid from the reservoir, and at least 25 one diffusion surface adapted to receive the liquid from the transfer member and facilitate its evaporation into the atmosphere, the diffusion surface extending essentially laterally from the transfer member and comprising at least one non-integral, non-porous sheet bearing a surface capillarity, which sheet has an extent and a capillarity sufficient to allow an appropriate evaporation.

30 The invention additionally provides a method of providing an atmosphere with a volatile liquid material, comprising the feeding of liquid volatile material to at least one diffusion

surface from a reservoir by means of a rod-like liquid transfer member, the diffusion surface comprising at least one non-integral, non-porous sheet having a surface capillarity and an extent sufficient to allow an appropriate evaporation, and being mounted on the transfer member such that it extends essentially laterally therefrom.

5

The reservoir can be any suitable reservoir, such as a bottle or jar of any suitable size or material, such as plastics, ceramics, glass and metal.

The essentially rod-like liquid transfer member serves to transfer the liquid from the 10 reservoir to the diffusion surface. It may be any suitable such member. By "rod-like" is meant a member that is elongate (length appreciably greater than the largest dimension of its transverse cross-section). The shape of this cross-section is irrelevant for the purposes of this invention. For example, the cross-section may be circular, triangular or square, circular being particularly preferred, for simplicity of manufacture and because many reservoirs, such as 15 bottles or jars, have circular orifices. However, it may also be oval or rectangular, and it can be essentially planar (formed from sheet material).

The transfer member may be any suitable constituency that allows it to convey liquid from the reservoir. For example, it may be a wick of porous material, as is well known to the art. 20 Such wicks are made of materials such as cellulose, ceramic, plastics and graphite. It may also be an external capillary transfer member of the type described in, for example, United States Patent No. 4,913,350. It is a surprising feature of this invention that the conventional wick performs as well as an external capillary transfer member, thus making possible considerable cost savings.

25

The diffusion surface useful in the present invention is least one non-integral, non-porous sheet having a surface capillarity. By "sheet" is meant that the surface is a continuous, non-perforated one. It may be planar or it may be curved — one of the advantages of the invention is the variety of shapes that can be used — but diffusion is a surface effect, as there is no absorption into the surface, because of the surface being non-porous. By "non-porous" is meant that the material of the sheet is completely lacking in porosity and is therefore incapable of absorbing liquid that flows thereon. By "non-integral" is meant that the sheet is

not made in a single piece with the transfer member but is made separately and attached thereto. This again allows considerably versatility in the selection of shapes and configurations. The sheet may be made of any suitable non-porous substance, for example plastics, ceramics, glass or metals.

5

By "surface capillarity" is meant that the sheet comprises a open capillary structure along which liquid can travel and which allows evaporation. This can be done by any convenient means. In a preferred embodiment, the capillaries can be produced on the sheet itself by moulding or machining. The open capillaries may have any suitable cross-section, for example, "U"-shaped, "V"-shaped or rectangular, and they may be in any configuration or pattern, practical or ornamental or both. For example, they may extend radially from a central point, they may be in one or more sets of parallel lines, which may intersect each other at any suitable angle. All lines may be straight or curved to any desired extent.

10 15 Alternatively, the sheet may have no such capillaries but may act as a support for a capillary material, for example, a porous or fibrous material affixed thereto by any convenient means. Any suitable capillary material may be used, but it is preferred not to use an absorbent material, as this tends to absorb and hold liquid material. An especially favoured material is a fibrous material that itself incorporates surface capillarity.

20

It is possible to have surface capillarity of any kind on both sides of the sheet, but it is generally preferred for reasons of ease of manufacture to have it on only one side, preferably on that side that will be uppermost in use.

25 The mounting of the diffusion surface on the transfer member may be at any point on the transfer member by any means, although it is preferred that the surface be mounted somewhere between the ends of the transfer member, most preferably nearer the reservoir than to the transfer member end remote from the reservoir. This allows for better functioning. Preferred embodiments are further described hereinunder.

30

It is an important feature of this invention that the at least one diffusion surface extend essentially laterally from the transfer member. Provided that there is good liquid transfer

between transfer member and diffusion surface (further described hereinunder), the exact configuration of the surface with respect to and nature of the lateral extension from the transfer member are not important, although, there are arrangements and orientations that work better than others. The diffusion surface may be of any suitable shape such as flat, 5 curved (simple or complex curves of any kind) and dished. Many possible configurations of diffusion surface are possible, and the skilled person will readily be able to provide many variants that lie within the scope of this invention. Examples include:

(a) a flat surface of any shape, surrounding and extending laterally from the transfer 10 member, the plane of this surface being essentially transverse to the longitudinal axis of the transfer member;

(b) as (a), but with the surface curved to form an arc or "dished" to form a shallow bowl, preferably in an upwardly direction with respect to the reservoir;

(c) at least one planar diffusion surface extending from the transfer member in the form 15 of a flat vane-like member, the plane of the vane-like member being at any convenient angle or orientation to the transfer member;

(d) as (c), but with the vanes curved in any desired fashion;

(e) a transfer member with a flat top, across which extends a diffusion surface, like the 20 horizontal stroke of a letter T, the diffusion surface being flat or curved.

The preferred configurations are (a) and (b).

The diffusion surface must naturally contact the transfer member in such a manner that liquid transfer from the transfer member to the diffusion surface is facilitated. This means 25 that the ends of the surface capillarity must directly and closely contact the surface of the transfer member. In the case of a wick, this is easier to achieve than is the case with an external capillary transfer member, as the entire wick is acting as a conduit for the liquid. In the case of an external capillary transfer member, there may need to be alignment of the various capillary systems. Alternatively, there may be placed between an external capillary 30 transfer member and a diffusion surface a layer of absorptive material, which can facilitate transfer of liquid from transfer member to diffusion surface. This works effectively, but it can add complexity and cost.

When the non-porous sheet itself comprises capillarity, optimal liquid transfer may be achieved by ensuring that the ends of this surface capillarity contacting the transfer member should be substantially perpendicular thereto. A reasonable variation out of the perpendicular 5 may be tolerated, but there will come a point when transfer will be impaired. Discovery of a suitable angle is well within the skill of the art.

When the non-porous sheet is merely the support for a surface capillary material mounted thereon, the angle is not quite so important, but nevertheless it is well understood that narrow 10 angles resulting in bowl- or cone-like shapes will impair evaporation, and therefore relatively open-faced (i.e., angles in the vicinity of perpendicular) are also preferred in this case.

There are several preferred structures that assist not only the liquid transfer but which also 15 assist in easy assembly. One particularly preferred embodiment involves the use of a transfer member of substantially circular cross-section, in which at least a part of the length thereof is slightly frusto-conical, that is, it tapers as it moves away from the reservoir. This ensures that a diffusion surface with an aperture of diameter intermediate between the largest and smallest diameters of the wick cannot slide too far downwards, and good contact is ensured. 20 In such a case, it is preferred that the sides of the aperture in the diffusion surface are angled to match the angle of the frusto-conical section. This ensures particularly good fit and liquid transfer.

In a further embodiment, the transfer member has provided on its surface an annular groove 25 and the diffusion surface is provided with a circular aperture of similar diameter, configured so that the diffusion surface can be snap-fitted into the groove, in the manner of a circlip. A particularly preferred embodiment is a combination of the groove and the frusto-conical shape. Alternatively, the transfer member may be provided with a slot, into which fits an identically-dimensioned tab provided on a diffusion surface. These are only some of the 30 possible ways of attaching the diffusion member; other ways will be clear to the skilled person.

The devices of the present invention have numerous advantages over devices already known to the art. They are easily and cheaply made from common materials. They are readily assembled from their components. They are readily refillable. In the case of fragrances, they 5 reduce considerably the tendency for the fragrance to change over time. Most surprisingly, this last-named advantage is achieved even when the transfer member is a wick, previously known for odour changes with time.

A further considerable advantage is the versatility conferred in regulating the amount of 10 evaporation. By altering the variables of the area and shape of the diffusion surface and the nature and concentration of the surface capillarity, a wide range of different evaporation rates can be achieved. Thus, a device can be supplied with a variety of easily-removable diffusion surfaces to suit particular circumstances, such as room size and concentration desired.

15

The invention is further described with reference to the drawings. These depict preferred embodiments and are not meant to limit the invention in any way.

Figure 1 is a perspective view of a preferred embodiment.

20

Figure 2 depicts a longitudinal cross-section of a transfer member at the point where it contacts a diffusion surface.

Figure 3 depicts an arrangement wherein surface capillarity is conferred by a porous material 25 affixed to a non-porous surface.

Figure 4 depicts a variety of possible surface capillarity arrangements.

Figures 2-4 are schematic and are not to scale, certain dimensions being exaggerated for the 30 purposes of clarity.

In Figure 1, a reservoir 1 (a bottle or jar) has a neck 2 into which is fitted a rod-like porous wick 3, this being a tight fit into the neck by means of a tightly-fitting elastomeric plug 4 that surrounds the wick. The wick is circular in cross-section and that part of the wick protruding from the reservoir is slightly conical as shown at Figure 2, having a narrower end 5 remote 5 from the reservoir and a broader end 6 closer to the reservoir. This permits the easy mounting on the wick of a diffusion surface 7, which has an aperture 8 of diameter greater than that of end 5 but greater than that of end 6. The aperture 8 is shaped so that it closely matches the frusto-conical surface of the wick, ensuring good contact and liquid transfer. The diffusion surface is a curved sheet of non-porous plastic that bears on its surface a series 10 of open capillaries 9.

In Figure 3, a frusto-conical wick 3 bears a non-porous diffusion surface 10. To this is affixed a capillarity-providing material 11. This material covers that surface of the diffusion surface facing downwards in normal operation and extends into the aperture 8 of the 15 diffusion surface, such that it contacts the wick and is able to absorb and transfer liquid for evaporation. The weight of the diffusion surface acting downwards helps secure the surface and establish a good liquid transfer contact.

In Figure 4, there can be seen a variety of surface capillarities. These are presented by way 20 of example only and they are not limiting of the many practical and ornamental possibilities.

## Claims:

1. A device adapted to provide volatile liquid material to an atmosphere, comprising a reservoir containing volatile liquid material, a rod-like transfer member extending therefrom and adapted to transfer liquid from the reservoir, and at least one diffusion surface adapted to receive the liquid from the transfer member and facilitate its evaporation into the atmosphere, the diffusion surface extending essentially laterally from the transfer member and comprising at least one non-integral, non-porous sheet bearing a surface capillarity, which sheet has an extent and a capillarity sufficient to allow an appropriate evaporation.  
5
2. A method of providing an atmosphere with a volatile liquid material, comprising the feeding of liquid volatile material to at least one diffusion surface from a reservoir by means of a rod-like liquid transfer member, the diffusion surface comprising at least one non-integral, non-porous sheet having a surface capillarity and an extent sufficient to allow an appropriate evaporation, and being mounted on the transfer member such that it extends essentially laterally therefrom.  
10  
15

## ABSTRACT

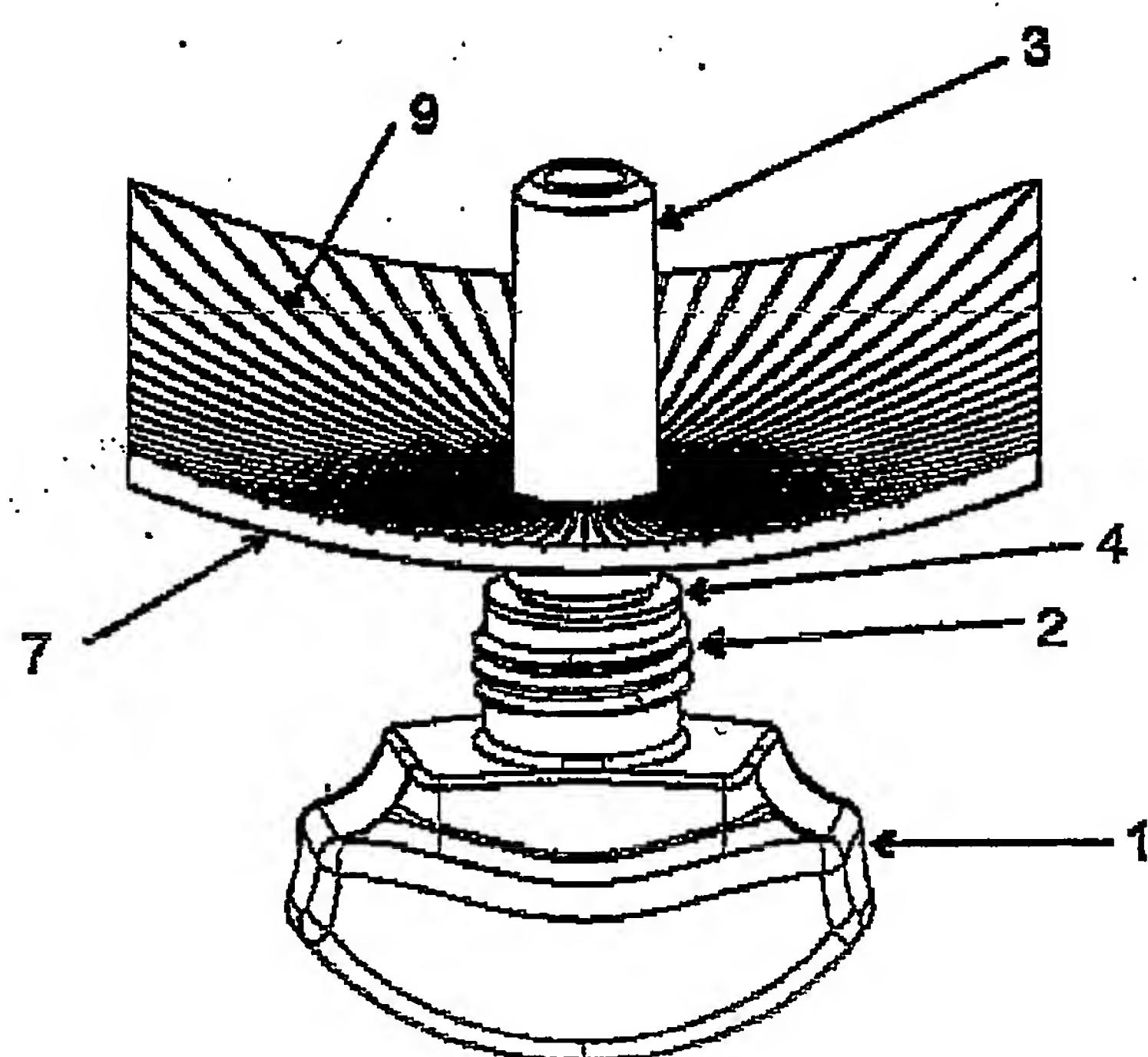
A device adapted to provide volatile liquid material to an atmosphere, comprising a reservoir containing volatile liquid material, a rod-like transfer member extending therefrom and 5 adapted to transfer liquid from the reservoir, and at least one diffusion surface adapted to receive the liquid from the transfer member and facilitate its evaporation into the atmosphere, the diffusion surface extending essentially laterally from the transfer member and comprising at least one non-integral, non-porous sheet bearing a surface capillarity, which sheet has an extent and a capillarity sufficient to allow an appropriate evaporation.

10

The device is cheap and easy to construct, versatile and diffuses odour without major changes of the odour over time.

1/3

Fig.1



2/3

Fig.2

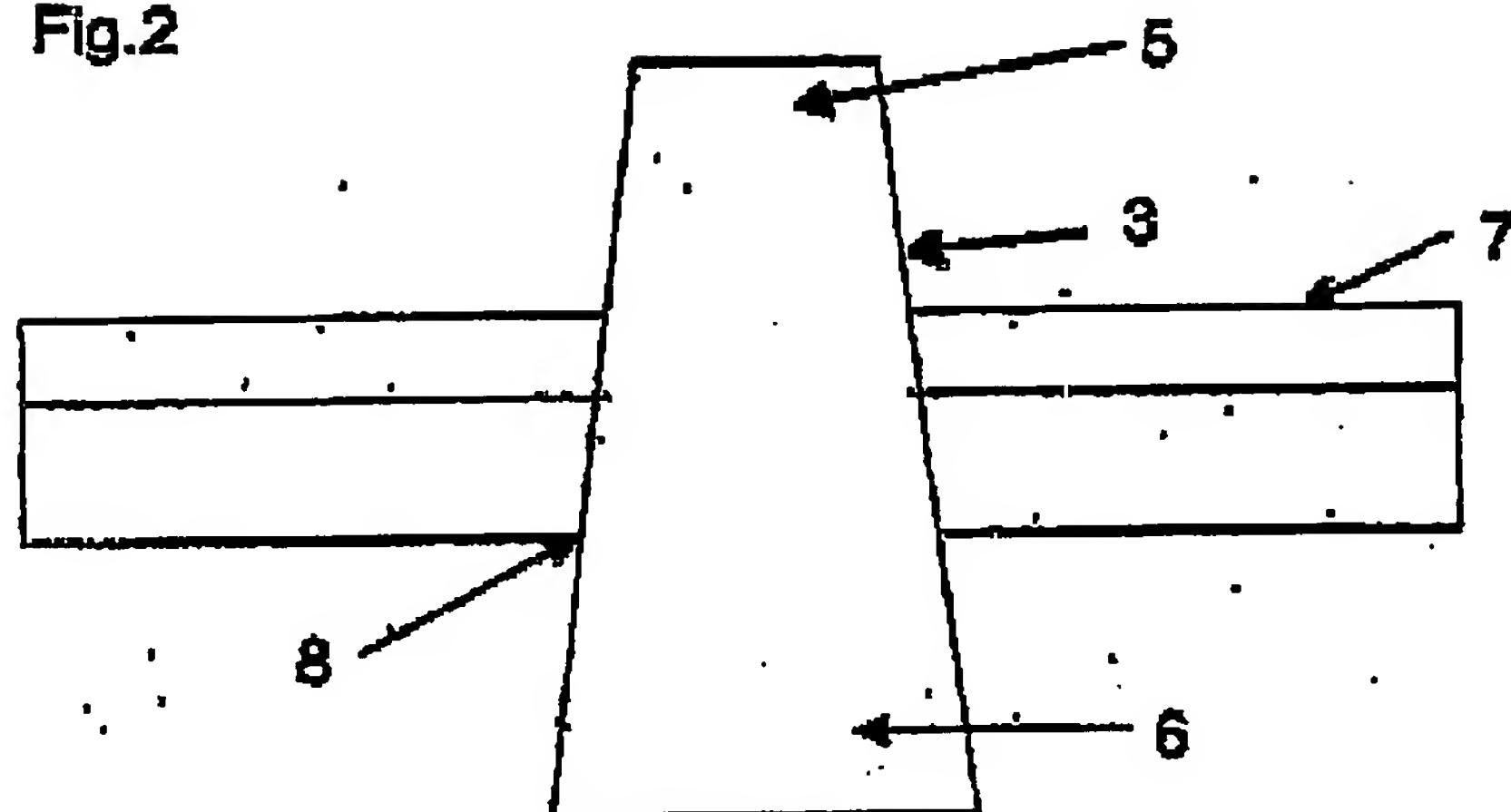
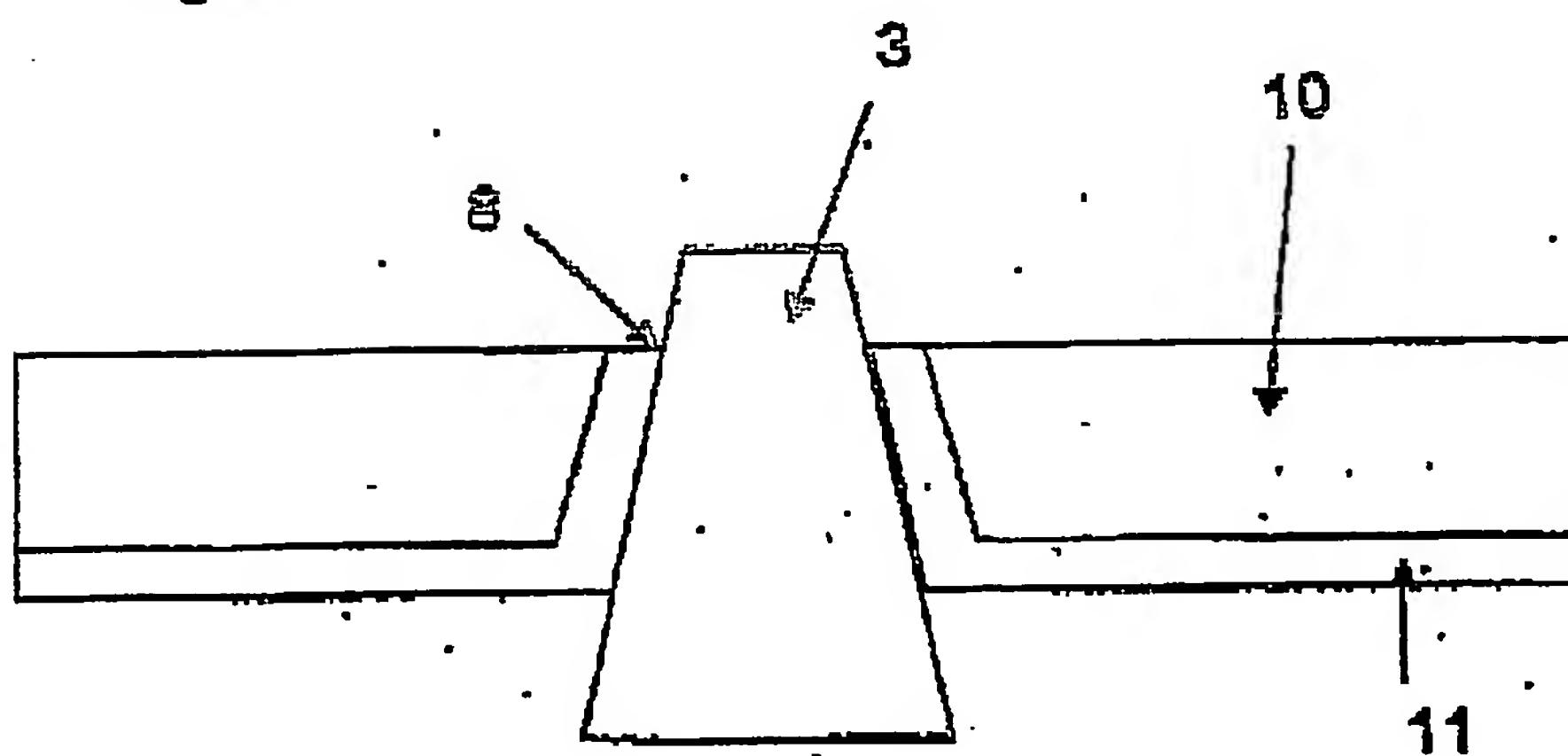
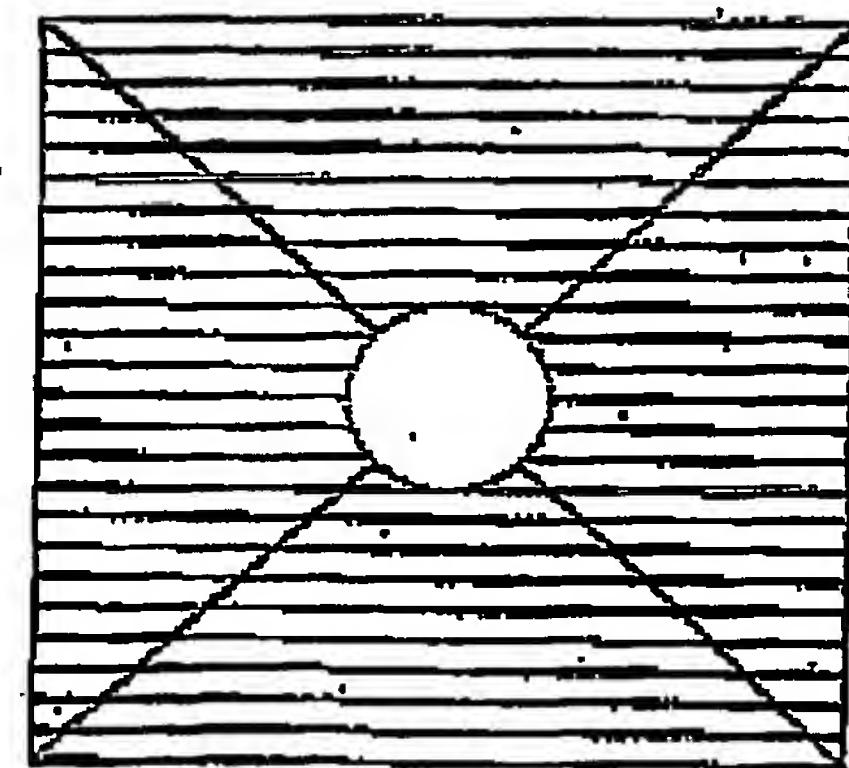
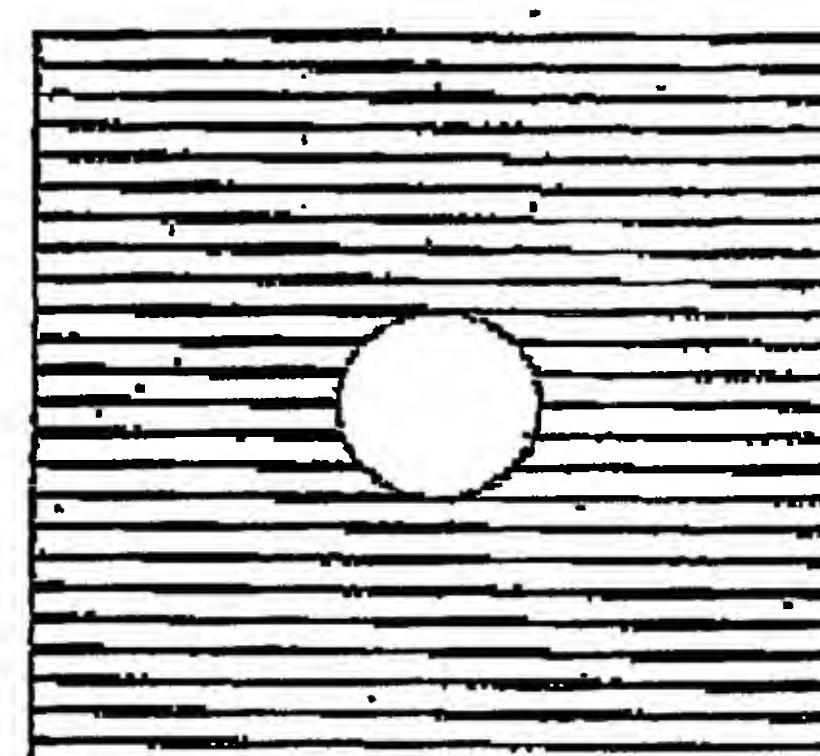
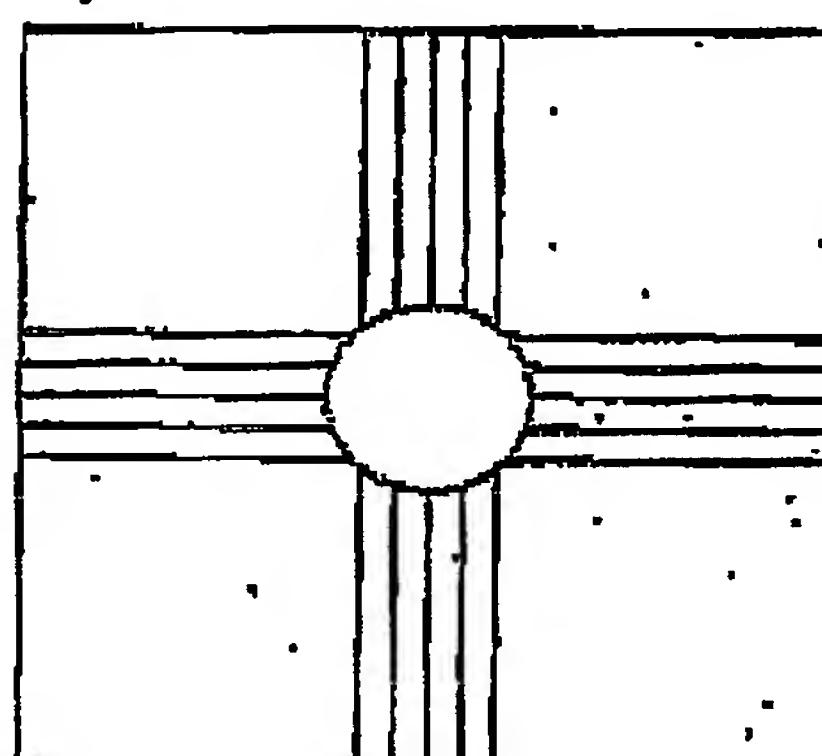
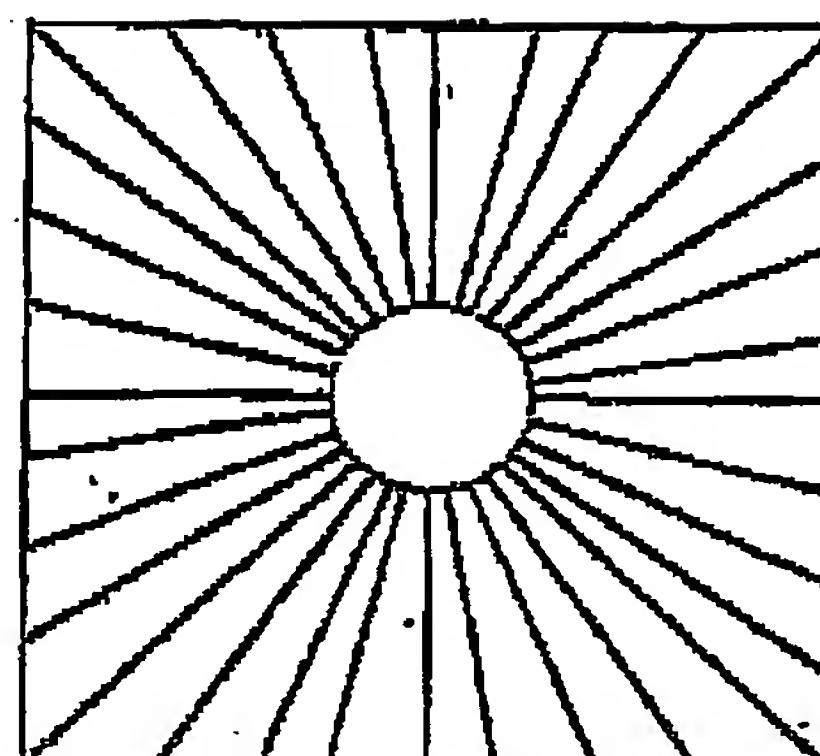
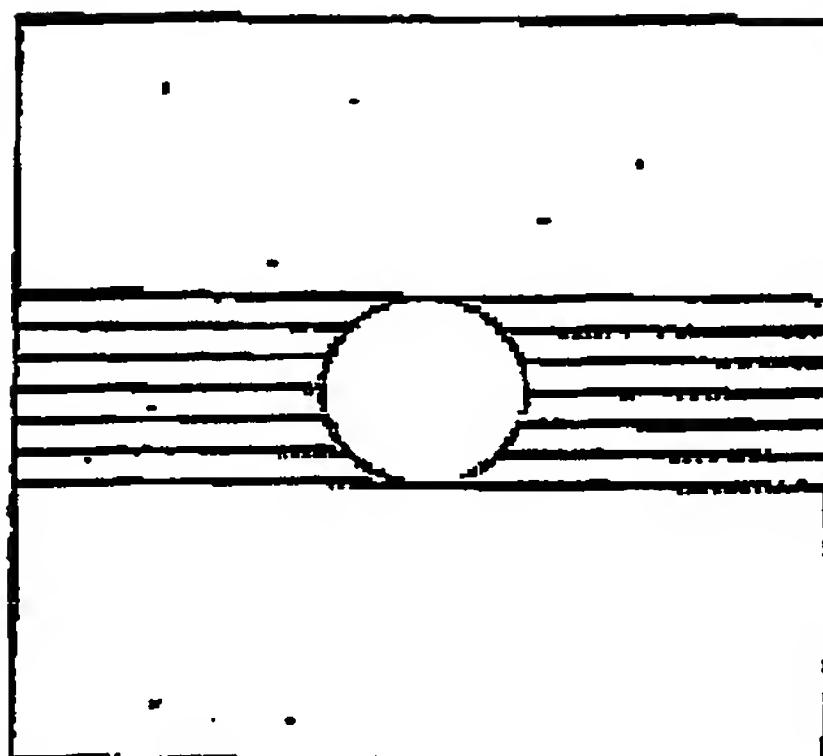


Fig.3



3/3

Fig.4



This Page is inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT OR DRAWING
- BLURED OR ILLEGIBLE TEXT OR DRAWING
- SKEWED/SLANTED IMAGES
- COLORED OR BLACK AND WHITE PHOTOGRAPHS
- GRAY SCALE DOCUMENTS
- LINES OR MARKS ON ORIGINAL DOCUMENT
- REPERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**  
As rescanning documents *will not* correct images  
problems checked, please do not report the  
problems to the IFW Image Problem Mailbox